AMERICAN COLLEGE OF RHEUMATOLOGY
EDUCATION • TREATMENT • RESEARCH

Specialists in Arthritis Care & Research

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The Immune System and its Link To Rheumatic Diseases

Our immune system is an amazing network of cells that function from very basic to highly complex levels. The purpose of this system is to protect us from our environment and watch for any early damage in our own cells. Sometimes, however, the system goes awry and misreads signals. As a result, our defenses do not recognize our own body at work, and begin "attacking" cells. This leads to illnesses called autoimmune (self-immune) diseases such as rheumatoid arthritis (inflammation of the joints), systemic lupus erythematosus (commonly known as "lupus," an inflammatory disease of connective tissue), and vasculitis (inflammation of a vessel of the body).

Fast facts

- When our immune system gets confused, it can do damage to our own bodies.
- Genetic background as well as particular environmental factors, such as smoking, can increase a patient's risk for developing an autoimmune illness.
- New biologic therapies specifically target the damaged components of our immune system as finely as possible.

What's the immune system?

The immune system allows us to identify and destroy foreign invaders (bacteria, viruses, fungi, etc) and survey our own cells to prevent them from growing uncontrollably (cancer and other disorders). Its complexity and ability to protect us is astounding.

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The system can be divided into innate (born with) and adaptive (developed through life) systems. The innate immune system is an evolutionary "ancient" system that reacts quickly to danger by identifying damaged cells as well as infectious invaders such as bacteria and virus. Cells of the innate immune system try to destroy the foreign intruders by surrounding them and releasing toxic molecules. The innate immune system also releases signals that recruit other cells of the immune system to join in the fight.

The adaptive immune system is a more recently evolved response that takes several days to develop, but allows the immune system to more specifically target foreign invaders. It does this by activating B and T cells, and developing antibodies. This adaptive response to an infection allows the immune system to remember that intruder, so if another attack occurs, the immune reaction is faster and more efficient.

There are times, however, when the balance is somehow disturbed. The immune system can no longer determine which cells are normal and which are abnormalities. The now confused immune system can cause damage to our joints, muscles, blood vessels and kidneys. This leads to illnesses called autoimmune (self-immune) diseases such as rheumatoid arthritis (inflammation of the joints), systemic lupus erythematosus (commonly known as "lupus," an inflammatory disease of connective tissue), and vasculitis (inflammation of a vessel of the body).

What causes the change?

Why this happens is not entirely clear. In some of these illnesses, the blood vessels are innocent bystanders. As our bodies are fighting a virus (e.g., Hepatitis C), we form antibodies and, together, the antibodies and antigens collect in the blood vessels creating inflammation. This causes inflammatory disease, the extent of which is dependent upon where and how many blood vessels are involved.

There are also genetic factors which influence our immune response as is clearly the case with rheumatoid arthritis. Patients with a genetic marker called HLA – DR4 have an increased risk of developing rheumatoid arthritis. However, more sophisticated studies have shown that this is only part of the story, and that other immunity and genetic variables control how the disease responds. In patients who have this genetic component, environmental stimuli (such as viruses or even smoking) cause the immune system to react in a particular way. When genetics enters the picture, this immune response triggers rheumatoid arthritis by gathering cells within the lining the joint and elsewhere.

Similar processes occur in systemic lupus erythematosus. The genetic background, as well as particular environmental exposures, creates a situation where that individual patient has an increased risk for developing one of these illnesses.

How are autoimmune diseases diagnosed?

Autoimmune diseases are very difficult to diagnose, and the right treatment must be carefully chosen for the right disease at the right time. Each diagnosis requires a thorough history and physical exam, and often many laboratory tests. If the patient has vasculitis, a biopsy of the skin or other system of the body may be required.

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If treatment is required, the drugs used may include corticosteroids such as cortisone as well as other drugs, such as methotrexate. These drugs may affect the immune system so careful monitoring of side effects is essential. Only a physician experienced with these drugs and diseases should monitor the therapies.

The physician will review a combination of medical history including that of any family members with autoimmune disease, a physical exam and the results of medical tests such as blood samples prior to making a diagnosis. This will probably include referral to a rheumatologist.

How are autoimmune diseases treated?

The key component of all of these diseases involves our own immune system, which contributes to the illness. So therapy targeting our own immune system can help alleviate the diseases themselves.

New biologic therapies are directed against the small molecules which orchestrate our own immune response. These drugs include inhibitors of tumor necrosis factor (TNF), IL1, and others.

By using specific targeted therapy against specific messengers, we can change our immune response, both for the good and for the bad. Any change in the immune system may control the disease, but may also subject us to different risks such as infection that need to be monitored by your rheumatologist.

Points to remember

- Autoimmune diseases may be difficult to diagnose, and treatment choices are very complicated. A rheumatologist is specifically trained to diagnose and treat these illnesses.
- Patients treated with new biologic therapies must be carefully monitored for adverse events to help achieve a positive outcome.

To find a rheumatologist

For a listing of rheumatologists in your area, click here.

Learn more about rheumatologists and rheumatology health professionals.

For more information

The American College of Rheumatology has compiled this list to give you a starting point for your own additional research. The ACR does not endorse or maintain these Web sites, and is not responsible for any information or claims provided on them. It is always best to talk with your rheumatologist for more information and before making any decisions about your care.

Arthritis Foundation
www.arthritis.org

American Autoimmune Related Diseases Association
www.aarda.org/

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Written by Erika Heidi Noss, MD, PhD and Jonathan Scott Coblyn, MD, and reviewed by the American College of Rheumatology Patient Education Task Force.

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